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GENERAL STUDIES (TEST CODE : 1241)

Name of Candidate	HARDIK AGARWAL		
Medium Eng./Hindi	Eng.	Registration Number	429079
Center		Date	15-08-19

INDEX TABLE

Q. No.	Maximum Marks	Marks Obtained
1	12.5	
2	12.5	
3	12.5	
4	12.5	
5	12.5	
6	12.5	
7	12.5	
8	12.5	
9	12.5	
10	12.5	
11	12.5	
12	12.5	
13	12.5	
14	12.5	
15	12.5	
16	12.5	
17	12.5	
18	12.5	
19	12.5	
20	12.5	

Total Marks Obtained:

Remarks:

INSTRUCTIONS

1. Do furnish the appropriate details in the answer sheet (viz. Name, Registration Number and Test Code).
   उत्तर पुस्तिका में सूचनाएं भरना आवश्यक है (नाम, प्रश्न–पत्र कोड, विद्यार्थी क्रमांक आदि)।
2. There are **TWENTY** questions printed in **ENGLISH & HINDI**
   इसमें बीस प्रश्न हैं अंग्रेजी और हिन्दी में छपे हैं।
3. **All questions are compulsory.**
   सभी प्रश्न अनिवार्य हैं।
4. The number of marks carried by a question/part is indicated against it.
   प्रत्येक प्रश्न/भाग के अंक उसके सामने दिए गए हैं।
5. Answers must be written in the medium authorized in the Admission Certificate, which must be stated clearly on the cover of this Question-Cum-Answer (QCA) Booklet in the space provided. No marks will be given for answers written in medium other that the authorized one.
   प्रश्नों के उत्तर उसी माध्यम में लिखे जाने चाहिए जिसका उल्लेख आपके प्रवेश पत्र में किया गया है और उस माध्यम का स्पष्ट उल्लेख प्रश्न–सह–उत्तर (क्यूसीए) पुस्तिका के मुख्य पृष्ठ पर अंकित निर्दिष्ट स्थान पर किया जाना चाहिए। उल्लिखित माध्यम के अतिरिक्त अन्य किसी माध्यम में लिए गए उत्तर पर कोई अंक नहीं मिलेंगे।
6. Word limit in questions, if specified, should be adhered to.
   प्रश्नों में शब्द सीमा, जहाँ विनिर्दिष्ट है, का अनुसरण किया जाना चाहिए।
7. Any page or portion of the page left blank in the Question-Cum-Answer Booklet must be clearly struck off.
   उत्तर पुस्तिका में खाली छोड़ा हुआ पृष्ठ या उसके अंश को स्पष्ट रूप से काटा जाना चाहिए।

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EVALUATION INDICATORS

1. Contextual Competence
2. Content Competence
3. Language Competence
4. Introduction Competence
5. Structure - Presentation Competence
6. Conclusion Competence

Overall Macro Comments / feedback / suggestions on Answer Booklet:

1.

2.

3.

4.

5.

6.

All the Best

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Answer all the questions in NOT MORE THAN 200 WORDS each. Content of the answers is more important than its length. All questions carry equal marks.

(12.5X20 = 250)

1. Explain the concept of Chandrasekhar Limit and highlight its significance in the field of astronomy.

चंद्रशेखर सीमा की अवधारणा की व्याख्या कीजिए और खगोल विज्ञान के क्षेत्र में इसके महत्व पर प्रकाश डालिए।

Chandrasekhar limit is the ~~1.5 times of the sun that~~ mass of a star beyond which it no more remains a star but ~~can~~ collapses under the gravitation and weight of itself.

Recently it was verified by detection of gravitation waves of a failed star that happened millions years ago.

Chandrasekhar limit has been employed to know the life cycle of stars that finally should convert to Big Hole.

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These calculations will help realise the nature of collapse of mass upon itself and determine the time it must have happened for past stars. if we can extrapolate that, then maybe we can determine ~~t~~ time for the Big-Bang ~~event~~ as well.

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2. What are nano-pharmaceuticals? Mention their application and highlight the need for regulating the nano-pharmaceuticals in India.

नैनो-फार्मास्यूटिकल्स क्या हैं? उनके अनुप्रयोगों का उल्लेख कीजिए और भारत में नैनो-फार्मास्यूटिकल्स को विनियमित करने की आवश्यकता पर प्रकाश डालिए।

Nano - technology refers to the technology on nano (10^{-9} m) scale to solve other problems. One such problem is in pharmaceutical so nano-pharmaceuticals comes there for effective drug delivery and medical devices and others.

Their applications include:

① Precise and effective and safe drug-delivery inside living body where generally doctors can't reach via ~~robots~~ nano-robots.

② Medical devices on nano scale are produced for knee implants, breathing aids, hearing aids. etc.

③ For health monitoring and

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check-ups also there may be used.

④ making pharma textiles such as band-aids, strops.

⑤ Use in bio-technology to make drugs ~~and study~~ and devices.

Need of regulation:

① Can be used without the knowledge.

(2) If misuse can lead to toxicity.

(3) Needs precision thus proper training for handling by doctors and staff.

(4) New industry and people are unaware so quacks and such should not fool and only registered doctors, specialist in this must be allowed to provide such care.

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3. Explaining the working mechanism of ramjet engine, highlight the significance of Solid Fuel Ducted Ramjet (SFDR) propulsion-based missile system for India.

रैमजेट इंजन की क्रियाविधि समझाते हुए, भारत के लिए सॉलिड फ्यूल डक्टेड रैमजेट (SFDR) प्रणोदन आधारित मिसाइल प्रणाली के महत्व पर प्रकाश डालिए।

Ramjet propulsion engine is used in missiles. This is a new technology developing from liquid fuel based thrust engines.

It has now moved to solid based rocket-fuels and now further to solid Fuel Ducted Ramjet propulsion-based engine that actually uses the thrust produced from the burning of fuel based on the oxygen or air available from outside the rocket only. Therefore now these missiles / rockets wouldn't have to carry that oxygen

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cylinder with itself, rather they can use atmospheric air/oxygen itself.

With this ~~more payload can~~ more fuel can come in payload and missiles can become light weight for faster and more farther reach and more effective and deceitful manoeuvre. This can especially be used in Air Defence System that requires speed and precision.

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4. Give a detailed description of the benefits provided by nuclear technology and materials in the field of agriculture, industry, medicine, public safety and environmental sustainability.

कृषि, उद्योग, चिकित्सा, सार्वजनिक सुरक्षा और पर्यावरणीय संधारणीयता के क्षेत्र में नाभिकीय प्रौद्योगिकी और पदार्थों द्वारा प्रदान किए गए लाभों का एक विस्तृत विवरण प्रस्तुत कीजिए।

Nuclear technology is a broad term that includes all the technology using concepts at sub-atomic level.

Generally only energy and radio-activity are popular but it is used in various sectors such as:-

Agriculture:

(1) To devise proper fertilisers, pesticide and check their effect on human health.

(2) Soil Health and nutrient availability determination.

(3) GM and other such hybrid technologies.

Industry:

(1) Electricity production using Nuclear power as ~~we~~ we all know.

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(2) Many materials are needed and thus produced for chips, materials used in communication and defence equipments.

(3) Use of lasers and microwaves in research and development of sophisticated equipments.

Medicine:

(1) Their use in treating cancer via radio-activity is immense.

(2) To identify iodine levels in body via I-131.

(3) For human health affected by various chemicals, nuclear tech is employed to identify imports and interdependence.

Public Safety:

(1) Use of nuclear technology in DNA fingerprinting.

(2) Bio-metric checks. ~~and~~

(3) Radioactivity detection and threats.

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Environmental sustainability:

(1) Ozone and other critical elements maintaining adequate levels.

(2) UV rays impact on human health.

(3) Carbon dating to realise forest value and age and impacts.

(4) Developing right plants and trees to tackle climate change via carbon sequestration.

India must develop culture of nano-technology and a mission on Nano-Technology and National Policy along with effective regulation is what we need.

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5. Examining the risk posed by space debris, suggest some measures which can be taken for its mitigation and removal.

अंतरिक्ष में मलबे द्वारा उत्पन्न जोखिम का परीक्षण करते हुए, इनके शमन एवं हटाने हेतु कुछ उपायों का सुझाव दीजिए।

Recent demonstration of space missile by India by Mission Shakti has raised concerns for emerging space debris as well.

~~Risk of~~ When space objects collide lot of space debris is created. Also when satellite space bodies are no more of use they end up being just waste or debris.

Risk associated with space debris:-

1) Can collide and destroy other space objects.
(2) Can come in the path of rockets.
(3) Very dangerous for astronauts space vehicle.

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(4) In future as a lot of may create trouble especially in low-earth orbit.

(5) difficult for poor countries to reach higher orbit. thus making it inequitable space for space technology.

Some measures required :-

(1) Adherence to outer space treaty and international treaty on space debris removal and management.

(2) Intl. co-operation to share info on space debris ~~and~~ and space bodies as already done.

(3) Global cooperation to reduce space debris.

(4) Greater Pay responsibility, that is each country must be liable for an equivalent amount of its own space debris.

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India must take the lead and build consensus on healthy use of outer space and create level playing field for all by first starting to reduce space debris.

Also it must delineate its intentions on being responsible enough to not use space missile to create systematic space debris.

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6. Explaining the concept of data exclusivity, bring out the arguments for and against incorporating data exclusivity norms in India's IPR regime.

डेटा एक्सक्लूसिविटी (डेटा विशिष्टता) की अवधारणा की व्याख्या करते हुए, भारत की IPR व्यवस्था में डेटा एक्सक्लूसिविटी संबंधी मानदंडों को सम्मिलित करने के पक्ष और विपक्ष में तर्क प्रस्तुत कीजिए।

Data exclusivity refers to the data obtained via clinical trials and other info during a research process and its trials.

By using data of one company other company can similarly and much easily produce same or similar products. This is especially useful in pharma industry where data of clinical trials forms integral part of production.

~~Neti~~ By data exclusivity such data can't be shared and used

Merits of Data-Exclusivity:

① Producer company enjoys benefit and more revenue.

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(2) Value is for one who put effort into collecting the data.

(2) With time and ~~data~~ geography and context, data results may change hence new data must be collected and used each time.

Demerits:

(1) Smaller companies can't rise and remain 'dwarf'.

(2) When second company is using the previously collected, some anomalies are detected and thus mandates ~~improvement~~ correction. That might not takes place.

(3) Poor developing countries will suffer the most.

India needs a thriving economy and regulation of IPR regime is critical but it should give enough space as well for new research to take place. For this issue some time ~~at least~~

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and clause may be added and legitimate payment for data usage to the parent company ~~and the~~ as a share of profit accrued by the beneficiary company.

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7. Internet of Things (IoT) promises to offer numerous opportunities across multiple sectors, but there are many challenges that need to be addressed in realizing its potential. Discuss.

इंटरनेट ऑफ़ थिंग्स (IoT) विविध क्षेत्रों में अनेकों अवसर प्रस्तुत करने का वादा करता है, लेकिन इसकी क्षमता को साकार करने के लिए कई चुनौतियों से निपटे जाने की आवश्यकता है। चर्चा कीजिए।

Internet of things refers to the technology or application where things that we commonly use are interconnected to each other such as TV, mobile, lights, fridge, desktop computer, car, home door, AC etc.

Potential of IoT ~~in~~ as and opportunities:

(1) Ease of living and living standard for rising middle class and urbanisation.

(2) Effective and reduced electricity consumption.

(3) Safety of appliances and home and driving.

(4) Care for children, elderly.

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(5) Independence and self-sufficiency for women.

(6) In industry used for automation and production for effective supply-chain management.

Challenges:

(1) Requires huge investment in electricity, internet.

(2) Appliances overhaul required for they must be sharing upgraded same protocols.

(3) Cyber-security needs to be ~~and~~ effectively considered.

(4) Data-privacy concerns.

(5) Technology and components are all imported. Import substitution must take place.

Way Forward:

(1) Industry-academia collaboration.

(2) Pilot projects to solve social

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problems first.

(3) Regulations and accreditation and standard protocols across industry.

(4) Data localisation and other cyber-security measures.

India is at a critical juncture with large changing demography. IoT must effectively be supported and used alongside 5G, AI, robotics and such new age technologies to solve our ground problems.

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8. Highlighting its potential, discuss the challenges that are being faced in generation and utilisation of energy from fusion process. What scientific advancements have been made in addressing these challenges?

इसकी क्षमता पर प्रकाश डालते हुए, संलयन प्रक्रिया से ऊर्जा के उत्पादन और उपयोग के समक्ष आ रही चुनौतियों की विवेचना कीजिए। इन चुनौतियों से निपटने में क्या वैज्ञानिक प्रगति हुई है?

Fusion process refers to the generation of energy ~~that~~ via fusion (collision) to two atoms of hydrogen (usually).

This generates tremendous amounts of energy as it happens in the sun and other stars.

Potential of such technology :-

(i) Only hydrogen required as fuel.

(ii) Completely clean.

(iii) Generous tremendous amounts of energy able to sustain all the needs of humanity even for future.

(iv) Not radioactive waste unlike nuclear fission energy.

(v) Can give rise to new elements like helium that may find some use

later as more research is undertaken

Challenges :-

(i) Uncontrollable amounts of energy.

(ii) One accident to powerful to destroy large parts of planet.

(iii) May give rise to new pollution and hazards as it is used later.

(iv) Huge investments are required into research at nascent stage that poor countries can't afford.

Advancements as yet :-

(i) China has recently unveiled plans and reactor for its research on thermonuclear fusion technology.

(ii) International Thermonuclear Energy Conference (ITEC) has made strides in its research and base in Antarctica or such will be set up for experiments. India is also a part of that.

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(iii) Feasibility check is being done to set up such plants on other planets like Mars or maybe moon. But it is too far fetched as of now.

Given the impact of burning carbon such advancements are necessary to increase and satisfy future needs.

But safety comes first be in thermonuclear fusion or fission technology. Dependence on carbon has to stop and advancement into H_2CO_3, H_2O Fuel cell etc. are welcome and need global cooperation and commitment.

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9. Highlight the significance of Gaganyaan mission for India. Enlist various challenges that the mission is likely to face.

भारत के लिए गगनयान मिशन के महत्व पर प्रकाश डालिए। इस मिशन के समक्ष अवतरित हो सकने वाली विभिन्न चुनौतियों को सूचीबद्ध कीजिए।

Gaganyaan mission is the man-to-space mission for ISRO that has set the target for itself in 2022. Recently there have been ~~such~~ some progress on this front such as:-

(1) Pact with Russia ROSCOSMOS for Indian astronauts to get training at ISS.

(2) Demonstration of Reusable Rocket launch vehicle by ISRO that can go and ~~take~~ bring back objects / humans.

(3) Govt's firm commitment and ISRO releasing the statement that it is well on its way to achieve the deadline.

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Significance of such a mission:-

(1) Name and glory for to become only the 4th country to be able to do so.

(2) Will bring business and investment for space technology to India.

(3) India can take on research and investments on moon and mars ~~etc~~ by humans.

(4) Can such technologies can even be used to bring back soil and such material from other ~~as~~ planets and bodies for study.

Challenges that remain:-

(1) Concerns for a poor country to have priority in space rather than fighting droughts/floods.

(2) Requires investment and technical know-how that ISRO

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should be away of.

(3) Life of astronauts is always in danger in such missions.

(4) The benefits of that to solve ground problems is not clear.

ISRO has already made a name for itself worldwide and Gaganyaan will be another feather in the cap.

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10. Though big data analytics offer opportunities for better policy formulation and improved service delivery to citizens, it also brings with itself many challenges, which the government needs to address. Examine.

यद्यपि बिग डेटा एनालिटिक्स बेहतर नीति-निर्माण और नागरिकों को बेहतर सेवा वितरण का अवसर प्रदान करता है, तथापि यह अपने साथ कई चुनौतियाँ भी लाता है, जिन्हें सरकार द्वारा दूर किए जाने की आवश्यकता है। परीक्षण कीजिए।

'Data' is the new oil for 21st Century as 'The Economist' put it. Big Data refers to the data that is so large in quantity (storage) that normal machines (home PCs); softwares (MS Excel) can't handle it and sophisticated machines dedicated to this task are required.

Big Data Analytics refers to the analysis of such data to bring out meaningful insights for multiple uses. Data mining is also a term used for such techniques.

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Opportunities:

(1) Find the missing links between the data.

(2) Use it for medicine to find people prone to diseases, efficacy of drugs, vaccines, spread of epidemics etc.

(3) Use in economics for finacing and for administration to catch the tax theft and hoarding and spread of black money. Like Project Insight of Tax authorities after demonetisation.

(4) In security to find culprits people and their links.

(5) In IOT and such technologies for better recommendations to buy right products and consume liked content.

Challenges:

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(1) Requires investment into storage infra.

(2) Our IT industry is not research based to lacking in such field.

(3) Universities have still not rolled out specialized branches for studying this unlike US, China where this was done 4-5 years ago.

(4) Govt. regulation and standardisation is required for personal data and privacy issues are also there.

(5) Our service Industry gave the required boom for Indian Economy but it has stagnated now and facing a threat to automation to finish our BPO like Jobs. Research and adoption of Big Data Analytics in this need of the hour.

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11. Elaborate on the concept, methodology and applications of DNA Fingerprinting.

DNA फिंगरप्रिंटिंग की अवधारणा, कार्यप्रणाली और अनुप्रयोगों का सविस्तार वर्णन कीजिए।

DNA Fingerprinting is the technology to take DNA samples and use them to identify and match criminals or suspects.

Because fingerprints may fail sometimes and may have been tampered with, DNA profile matching or fingerprinting is more safe and secure for identification.

Govt. has brought in a draft Bill on this ~~to~~ cs. with following element :-

1. Setting up a new authority to regulate.
2. Mapping of centres / labs to store such DNAs.
3. Destruction of DNA collected after case completed.
4. Using DNA only for this purpose

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as per mandated by court/ tribunal in regards of a case.

Applications of DNA fingerprinting

(1) To identify criminals / suspects.

(2) To figure out lineages and hierarchy.

(3) Do genome sketching and find out vulnerable genes to particular disease / epidemic.

(4) Help in somatic cell technology to reproduce organs.

(5) In Blood transfusion process.

Further explanation:

DNA fingerprinting is based upon the gene that works like a code that tells what protein to produce.

And the levels of protein produced ~~determine~~ constitute and thus

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determine our body.

Thus this DNA is most critical part and is 'can unique and unchangeable for any living organism.

By identification that DNA (sequencing of protein chains) one DNA can be matched to another.

Because it is unchangeable, identification is safe and exact.

misuse of DNA collected can also be done, therefore govt. must take ample precaution to limit such use.

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12. Highlight the applications of supercomputers. What steps have been taken by India to establish its domestic supercomputing ecosystem? Also, suggest some further steps which can be taken by India in this regard.

सुपर कंप्यूटर के अनुप्रयोगों पर प्रकाश डालिए। भारत द्वारा अपने घरेलू सुपरकंप्यूटिंग पारितंत्र की स्थापना के लिए क्या कदम उठाए गए हैं? साथ ही, इस संबंध में भारत द्वारा उठाए जा सकने वाले कुछ भावी कदमों का सुझाव दीजिए।

Supercomputers are large, complex and sophisticated computers that do a lot more than the usual computers / laptops / smartphones.

Applications of supercomputers :-

① In Big Data analytics to process large chunks of data easily for various purposes such as medicine, education, business etc.

② Do meteorological data study by simulation on large data and multiple equations to factor various elements of nature. for to be able to predict and forecast weather phenomenon.

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③ Use to solve artificial intelligence problems in developing complex neural networks.

④ Required in safety checks of in networks for filtering of suspicious information in surveillance.

India has recently launched Param Yuvak and Mihir as supercomputers that has brought India in the list of elite nations with high supercomputer powers measures in Flops (Peta byte operations per second)

Starting from establishment of C-DAC in 1961, India has come a long way, further steps to be taken in this regard include:-

① Allow some of them to be used in universities for research and development environment and motivate students by giving them

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hands-on.

② Foreign collaboration on further development and safe practices to use.

③ Research into quantum computing, China already leading the way.

④ Sharing and using supercomputers for international diplomacy in regions specifically as South Asia.

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13. Compare and contrast fifth generation (5G) of wireless telecom technology with 4G technology. What challenges need to be overcome for 5G's pan-India rollout?

4G प्रौद्योगिकी के साथ पांचवी पीढ़ी (5G) की वायरलेस दूरसंचार तकनीक की तुलना कीजिए और उनके मध्य अंतर बताइए। 5G के अखिल भारतीय क्रियान्वयन हेतु किन चुनौतियों से निपटने की आवश्यकता है?

5-G technology has been unveiled in USA and South Korea with other countries like China soon ~~come~~ catching up.

Advancements that come with 5G include:-

1. Ultra-low latency.
2. Super fast speed of data transmission upto 1-3 GBPS.
3. Use of narrow band for extra-transmission.
4. 24x7 connectivity with too few outlets and outages.
5. Special protocols for fast upload as well as download.

But all of this comes with few challenges as well:-

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① India requires 5 lakh crore investment to connect 5G all over.

② Based on optical fibre connection

③ Requires substation to connect with main via optical fibre. whereas in India we have only 20% as copper fibre and 80% as microwave which is too old.

④ safety protocols are advanced.

⑤ Technology and equipments need overhaul in all systems.

⑥ Huge imports are required because such equipments telephonic equip are not manufactured in India.

⑦ Concerns of privacy with such telecommunication coming from China by Huawei company. as raised in the US & Canada.

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5G has huge applications in IoT and tele-education, tele-medicine and big data and cloud computing. Roll out of this can help many problems of our country via effective use of ICT in and e governance.

Govt. has already special commission to design strategy for such rollout by 2020. But bad condition of telecom market is a concern because they are mostly in debt due to disruption and excessive spectrum charges and too low consumption charges from consumers due to competition.

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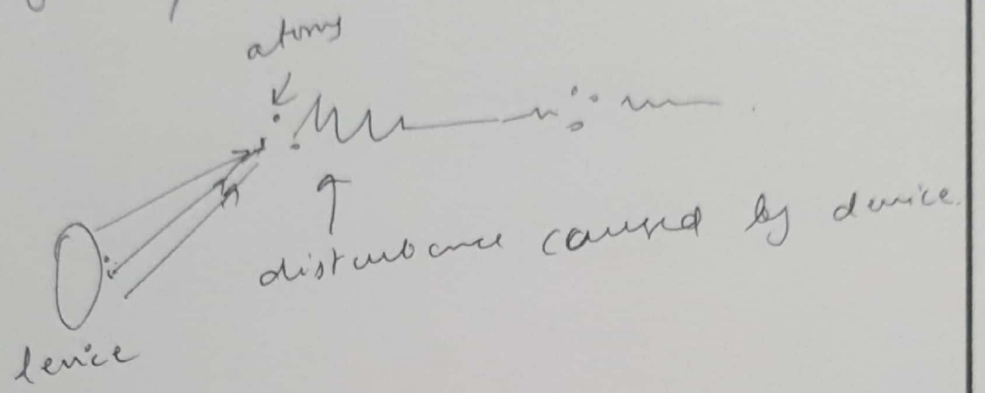
14. Explain the concept of optical tweezers and state their working principle. Also, highlight some of their applications.

ऑप्टिकल चिमटी (ऑप्टिकल ट्वीजर) की अवधारणा की व्याख्या कीजिए और उनके कार्यचालन सिद्धांत को स्पष्ट कीजिए। साथ ही, उनके कुछ अनुप्रयोगों पर प्रकाश डालिए।

This year noble prize has been awarded to the discovery of optical tweezers.



We know that all matters send electromagnetic radiation on acceleration. For subatomic particles and photons such effect is much more observable.

Optical Tweezers uses the concept of ~~wa~~ waves to produce highly effective lasers via ~~production~~ motion (tweezing) of such particles at micro-scopic scale.

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Although laser also uses the same concept, but optical tweezing is much more exact and effective at minute nano-scale.

Applications:

1. Effective drug-transmission via radiation.
2. Chemo-therapy and other cancer relieving technologies can be made more safe and effective.
3. Making of nano-chips.
4. Use in satellites and space technologies to study materials.

India must also welcome such innovations and build such R&D environment domestically to allow people to come up with ideas and then do research and cater vast market for applications.

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For promoting noble prizes, we can set up a dedicated committee to make action-plan and sustain the momentum via Institutions of Eminence receiving heavy govt. funding.

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15. Though Hydrogen enriched Compressed Natural Gas (H-CNG) fuel is dubbed as a better substitute of CNG, there remain certain challenges in making it commercially viable. Discuss.

यद्यपि हाइड्रोजन समृद्ध संपीडित प्राकृतिक गैस (H-CNG) ईंधन को CNG के बेहतर विकल्प के रूप में जाना जाता है, तथापि इसे व्यावसायिक रूप से व्यवहार्य बनाने में कुछ चुनौतियाँ बनी हुई हैं। चर्चा कीजिए।

H-CNG is dubbed as a better substitute of CNG for its many benefits such as:-

(i) Not very expensive than CNG.
(ii) much reduced pollutants.
(iii) Engines don't require overhaul or change.
(iv) Energy-wise more efficient.

Challenges:

(1) Setting up regulation is difficult hence chances of non-compliance and adulteration in fuel.
(2) Technology and know-how for such fuel is to be developed and checked for

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safety.

(3) Hydrogen as a fuel even with CNG requires huge volume by weight, so difficult in transportation.

(4) The changes required in engine, efficiency modulation, vehicle fuel container size, may affect the auto industry already under stress.

(5) May stop the momentum in ~~H2G~~ replacing CNG as a fuel which is carbon based.

H-CNG is a welcome step but should be seen as a start to process of decarbonising our fuels.

Further research in bio-methane, bio-ethanol, fuel cell cells etc. must be continued and ~~strg~~ strengthened.

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16. Discuss the challenges confronting higher self-reliance and indigenisation of defence industry in India. What steps can be taken to accelerate its pace?

भारत में रक्षा उद्योग के समक्ष उच्च आत्म-निर्भरता और स्वदेशीकरण से संबद्ध चुनौतियों की विवेचना कीजिए। इसकी गति को तीव्र करने हेतु क्या कदम उठाए जा सकते हैं?

Defence Planning Council has been setup to outline an overall roadmap for defence sector in India. One of its recommendation include indigenisation of defence equipments and aims for self-reliance to protect sovereignty.

Challenges in self-reliance and indigenisation:-

1. lack of technical know-how
2. low manufacturing base.
3. Absence of private sector participation significantly.
4. ~~Avai~~ Absence of availability of critical raw materials

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which have to be imported otherwise, who supply is not stable.

(5) Industry - govt - academia collaboration is absent in this sector.

Way Forward:

(1) Involving private sector by starting to ~~delga~~ delegate supply of non critical and supporting equipments.

(2) All foreign deals to involve technology transfer and self-maintenance.

(3) supply of critical components to be ~~sub~~ substituted by domestic manufacturing.

(4) Following standard global protocols especially in communication and networks protocol.

(5) set up a long term action plan and prepare for future.

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(6) Start to sell already developed technology to other countries to generate resources.

(7) Prefer collaborations that direct and simple buying.

(8) Increase defence spending in capital sector.

Defence Acquisition Council, Strategic Private Partnership in Defence, Make in India are significant steps to make ourselves self-reliant.

Following recommendations of DPC is essential in to ensure security and indigenisation both in the long run.

Because safety and security of nation can't be compromised with, adequate spending is necessary and too for capital acquisition and creation and not just salaries and pensions.

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17. Artificial Intelligence (AI) and robotics can prove to be a game changer in comprehensively improving the primary, secondary and tertiary sectors of Indian economy. Comment. Also, enumerate various policy measures which can help leverage these technologies for furthering our social and economic objectives.

कृत्रिम बुद्धिमत्ता (AI) और रोबोटिक्स भारतीय अर्थव्यवस्था के प्राथमिक, द्वितीयक और तृतीयक क्षेत्रकों में व्यापक सुधार लाने में महत्वपूर्ण परिवर्तक सिद्ध हो सकते हैं। टिप्पणी कीजिए। साथ ही, उन विभिन्न नीतिगत उपायों को सूचीबद्ध कीजिए जो हमारे सामाजिक और आर्थिक उद्देश्यों को आगे बढ़ाने हेतु इन तकनीकों का लाभ उठाने में सहायता कर सकते हैं।

Artificial Intelligence and Robotics are technologies that promote automation and machine based learning and decision-making to ease the work of man and solve complex problems easily and effectively such as in various sectors :-

Primary:

1. Use in agriculture to detect soil types and recommend right fertilizers, pesticide, herbicide.
2. Suggest right cropping patterns.
3. Allow effective water sprinkler and pesticide-fertilizer spreaders via robots.

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Second day :-

① Automation in manufacturing to ease production and make it fast and problem free.

② Design right production processes for effective inventory and supply-chain management.

③ Gauge market demand well

④ ~~and~~, Driver-less cars, drones, IoT equipments all need manufacturing sector to level up.

Service sector:

① Use in e-governance to reach the needy first and easily.

② Effective delivery of service in logistics sector.

③ Use in forecast and prediction in meteorological phenomenon.

④ Better financial transactions audit and monitoring.

⑤ Banking and digital payments.

⑥ Botnet cleaning and cyber-security.

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Various policy measures include

→ (1) Skill India + Make in India
(2) New super computers
(3) Cybersecurity measures by meity, CERT-in, NCCC.
(4) Setting up committee on AI.
(5) Drone policy and Bill.
(6) Roll out of 5G, committee

AI and Robots are good only in controlled by humans otherwise there are hazards of they overpowering us for absence of ethics in machines. Loss of jobs and data privacy are other concerns to be away off.

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18. Mentioning some its key features, highlight the benefits and applications of Hyperspectral Imaging Satellite recently launched by ISRO.

हाल ही में, ISRO द्वारा प्रक्षेपित किए गए हाइपरस्पेक्ट्रल इमेजिंग सैटेलाइट की कुछ प्रमुख विशेषताओं का उल्लेख करते हुए, इसके लाभों और अनुप्रयोगों पर प्रकाश डालिए।

ISRO recently launched its over-the-top hyper state-of-the-art Hyper Spectral-Imaging-Satellite a first-of-its-kind in the category of Remote Sensing and Geo-mapping.
More will follow this and be useful in various sectors of our socio-economy and security.
Its features include use of multi-spectral imaging to detect and highlight minute details on earth's surface with much more clarity and scope of detection than before.

Benefits and applications:-

(1) For soil health check.
(2) Soil water availability.

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(3) Study of landscapes and threats for disaster.

(4) DAM dams water level monitoring and ~~other~~ similar for river flow and sea-level rise.

(5) For forest canopy measurement and pollution calculation via clouds density and composition mapping.

(6) It can also be used to identify for security by identifying foreign base on border. ~~and the~~

~~type too~~

Such imaging satellites are increasingly being used by other countries as well to solve complex problems on ground via satellite high-above the sky.

NAVIC, IRNSS, other communication satellites must be used effectively for all sectors. Military satellites launch is also commendable and nationally.

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19. What are neutrinos? In the context of India-based Neutrino Observatory project, bring out the significance of studying neutrinos.

न्यूट्रिनो क्या हैं? भारत-स्थित न्यूट्रिनो वेधशाला परियोजना के संदर्भ में, न्यूट्रिनो के अध्ययन के महत्व को प्रदर्शित कीजिए।

Neutrinos are ever present subatomic particles that form the even smaller parts of neutrons and protons.

Some characteristics of neutrinos:-

① subatomic and undetectable with eyes or even common microscopes.

② Form the ~~sub~~ constituent particle of atomic particles like neutrons, protons as we know.

③ They are everywhere and infinite in number crossing us each second in millions in air.

④ They are not easily deflected by electromagnetic radiation.

India has decided to set up a neutrino observatory in Tamil Nadu. ~~Some facts~~

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~~associated with~~ such observatory :-

- ~~It~~ is deep below surface of earth, because neutrinos are less in number there and easy to detect.
- Very few countries in world are doing this and India will be like a pioneer in this field having first mover advantage if successful.

~~They~~ There ~~are~~ is other significance as well :-

1) help to solve some mysteries surrounding black hole.
2) Radioactivity and other subatomic phenomenon may be more comprehensible.
3) make a research environment in the country, largely stagnant as yet.

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4) motivate scientists and researchers to look ~~of~~ towards India.

5) might be a chance for another ISRO in sub-atomic field research and technology.

Recently govt. is taking many initiatives like ASTROSAT, space based observatory, GROWTH telescope, deep ocean mission to expand our knowledge in unchartered territories.

It must be kept in mind to use these technologies finally for the welfare of mankind and the poorest the first.

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20. Among others, low R&D expenditure, is a key challenge facing the innovation ecosystem in India. Discuss.

अन्य बातों के साथ, अनुसंधान और विकास पर कम व्यय, भारत में नवाचार पारितंत्र द्वारा सामना की जाने वाली एक महत्वपूर्ण चुनौती है। चर्चा कीजिए।

India stands far poor in Global Innovation Index and 10th in patent filing much below what our population can supply and needs.
Our scientists and engineers have made a mark all over the world but domestically research and innovation has suffered for multiple reasons such as:-

1) Low R&D Expenditure
(i) Only 2.8% spent on education
(ii) research gets below 1%
(iii) Research expenditure is thought of as extravagance for a ~~pp~~ poor country.
(iv) Low salaries for researches and

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teachers.

(1) Low and delayed allocation of funds for labs.

(2) Brain drain

(3) Lack of policy support and consistency.

(4) Poor regulation and standardisation thus failing in global standards.

(5) Lack of autonomy and over-centralisation.

(6) Lack of accreditation and regular checking of labs for safety protocols and safe practices.

(7) Lack of environment and thrust overall for bio-tech research, preference to the method of Jack.

(8) Below standard primary and secondary education leading to over-all poor quality in higher education and research.

Way Forward:

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1) Increase spending as share of GDP.

2) Improve autonomy in allocation and use of funds via effective decentralisation in academic institutions.

3) Improve industry - civil society - market - academia government institutions collaboration to promote research as a solution.

4) Integrate labs to market directly for their reach to market for self-sustenance financially.

5) Improve foreign collaborations and check and reduce Brain-Drain.

Schemes like IMPRINT, STARS, SRARCS, IMPRESS, UAIRO, Atal Mission on Innovation are commendable and sure to give thrust to research environment in the country. These are for solving basic problems for Indian society must also be considered sincerely.

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GENERAL STUDIES (TEST CODE : 1244)

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Medium Eng./Hindi	Eng	Registration Number	429074
Center	online	Date	01-09-19

INDEX TABLE

Q. No.	Maximum Marks	Marks Obtained
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19	15	
20	15	

Total Marks Obtained:

Remarks:

INSTRUCTIONS

1. Do furnish the appropriate details in the answer sheet (viz. Name, Registration Number and Test Code).
   उत्तर पुस्तिका में सूचनाएं भरना आवश्यक है (नाम, प्रश्न–पत्र कोड, विद्यार्थी क्रमांक आदि)।
2. There are **TWENTY** questions printed in **ENGLISH & HINDI**
   इसमें बीस प्रश्न हैं अंग्रेजी और हिन्दी में छपे हैं।
3. **All questions are compulsory.**
   सभी प्रश्न अनिवार्य हैं।
4. The number of marks carried by a question/part is indicated against it.
   प्रत्येक प्रश्न/भाग के अंक उसके सामने दिए गए हैं।
5. Answers must be written in the medium authorized in the Admission Certificate, which must be stated clearly on the cover of this Question-Cum-Answer (QCA) Booklet in the space provided. No marks will be given for answers written in medium other that the authorized one.
   प्रश्नों के उत्तर उसी माध्यम में लिखे जाने चाहिए जिसका उल्लेख आपके प्रवेश पत्र में किया गया है और उस माध्यम का स्पष्ट उल्लेख प्रश्न–सह–उत्तर (क्यूसीए) पुस्तिका के मुख्य पृष्ठ पर अंकित निर्दिष्ट स्थान पर किया जाना चाहिए। उल्लिखित माध्यम के अतिरिक्त अन्य किसी माध्यम में लिए गए उत्तर पर कोई अंक नहीं मिलेंगे।
6. Word limit in questions, if specified, should be adhered to.
   प्रश्नों में शब्द सीमा, जहाँ विनिर्दिष्ट है, का अनुसरण किया जाना चाहिए।
7. Any page or portion of the page left blank in the Question-Cum-Answer Booklet must be clearly struck off.
   उत्तर पुस्तिका में खाली छोड़ा हुआ पृष्ठ या उसके अंश को स्पष्ट रूप से काटा जाना चाहिए।

16-B, 2nd Floor, Above National Trust Building, Bada Bazar Marg, Old Rajinder Nagar, Delhi-110060

Plot No. 857, 1st Floor, Banda Bahadur Marg (Opp Punjab & Sindh Bank), Dr. Mukherjee Nagar Delhi- 110009

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EVALUATION INDICATORS

1. **Contextual Competence**
2. **Content Competence**
3. **Language Competence**
4. **Introduction Competence**
5. **Structure - Presentation Competence**
6. **Conclusion Competence**

Overall Macro Comments / feedback / suggestions on Answer Booklet:

1.

2.

3.

4.

5.

6.

All the Best

아가은 쏟하드18052078Enterprise S/W Lab(VD)**21210453 20190830174515

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1. Discuss the need of an Independent Fiscal Council (IFC) in bringing about transparency and accountability in fiscal processes in India. **(150 words) 10**

भारत में राजकोषीय प्रक्रियाओं में पारदर्शिता और जवाबदेही का समावेश करने हेतु एक स्वतंत्र राजकोषीय परिषद (IFC) की आवश्यकता की चर्चा कीजिए।

N.K. Singh Committee on review of FRBM Act, 2013 had recommended for setup of an independent Fiscal council for fiscal discipline in India. Some features as recommended:-

① Committee to suggest ways to maintain fiscal discipline.

② If fiscal target is not within the range the IFC need to permit the govt. to doing so.

③ In case of urgency or economic turmoil, IFC can allow missed fiscal targets.

Need for such a committee:-

① Check populism of electorally chosen government that might give into popular demands.

② Maintain fiscal discipline and bring professionalism.

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(iii) Keep track on the progress of fiscal spending and raise alerts for future.

(iv) Devise a common platform for govt, RBI and other bodies for a coherent fiscal policy.

Recent farm loan waivers by various state governments and UDAY scheme and demands for minimum basic income are worrisome for fiscal environment in India and therefore require prudent measures to reign into populism and allow future sustained economic growth of the country.

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2. Recognizing the potential of exports in generating employment, a number of steps need to be taken to address India's weakening export competitiveness. Analyze. **(150 words) 10**

रोजगार सृजन हेतु निर्यात क्षेत्र की क्षमताओं की पहचान करते हुए, भारत की कमजोर होती निर्यात प्रतिस्पर्धा को संबोधित करने हेतु कई कदम उठाए जाने की आवश्यकता है। विश्लेषण कीजिए।

New Export policy aims to double share of Indian exports of total world trade from around 1.6% to more than 3%.

This involves extra thrust upon agricultural export policy and 'make in India' for manufacturing

Challenges of Export Competitiveness of Indian economic setup:-

1. Lack of export chains of global standards from producer to exporter.
2. High logistics cost (14% of GDP) to be reduced to (9% of GDP)
3. Lack of clear regulations and ease of doing business.

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(4) Poor critical infra like electricity, fuel.

(5) High taxation and difficulty in tax filings.

Way Forward

(1) Promote skilling, apprenticeship and vocational education to bridge skill deficit gap.

(2) Promote Inland waterways, airways, proper freight railways and world class road infra for reducing logistics cost.

(3) Entrepreneurship and ease of doing business to be promoted.

(4) IPR and innovation boost

China is reducing as an investment destination, before Vietnam and other countries take over, we should boost our efforts in this direction. NEIS, SEIS, Make in India, GST, support to MSMEs are some of these steps.

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3. Highlighting the main features of National Mineral Policy, 2019, discuss how it can help in ensuring sustainable and responsible mining.
(150 words) 10

राष्ट्रीय खनिज नीति, 2019 की मुख्य विशेषताओं पर प्रकाश डालते हुए, चर्चा कीजिए कि यह संधारणीय और उत्तरदायित्वपूर्ण खनन सुनिश्चित करने में कैसे सहायता कर सकती है।

Moving on from NSLP and MMDR and send mining policies, govt. has brought an overall National mineral policy, 2019 to for healthy promotion and regulation of this sector.

Some features of the policy:

① Open Acreage policy promotion

② Allow private players to suggest blocks of mining and then govt. can open them for bidding.

③ Provide linkages to coal and other plants to use minerals.

④ Elements for environmental and community support.

⑤ Strengthening and mandatory contribution to District Mineral Funds (DMFs)

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How it is supposed to ensure sustainable and responsible mining.

① EIA, contribution to DMF and social audit will ensure benefits to local community.

② Open up new areas for mining thus reducing pressure upon already ones.

③ lead to exploration of new areas, minerals such as deep Ocean mission.

④ Bring predictable and clear regulations for all sector including coal, sand, energy, metal etc

National Steel Policy, Coal Block allocation measures, catyorising mining as an industry are some of the governed initiatives in the sector to be strengthened further.

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4. Highlighting the salient features of the PM JI-VAN Yojana, analyze how it can assist in achieving the vision and goals of the National Policy on Biofuels, 2018. **(150 words) 10**

"प्रधानमंत्री जी-वन योजना" की मुख्य विशेषताओं पर प्रकाश डालते हुए, विश्लेषण कीजिए कि यह जैव ईंधन राष्ट्रीय नीति, 2018 की दृष्टि और लक्ष्यों को प्राप्त करने में किस प्रकार सहायक हो सकती है।

Pradhan mantri Jain Indhan Avataran Yojana is a commendable push to biofuels in the country

Salient Features include:

① Include non-food crops for bio-fuel production.

② Target for 20% methanol blending in petrol ~~and~~.

③ 1G - bio-ethanol, 2G - bio-CNG and other biofuel categorisation to be achieved in phased manner.

④ Create ecosystem for bio-fuel adoption by distributors, consumers and auto-makers.

Benefits of such a scheme in realising goal of National Biofuel Policy, 2018:

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① Promote investment and R&D in bio fuels sector.

② Allow growth of non-food crops like Jatropha.

③ Allow use of Sugar bagasse (waste) to converted to bio-fuel.

④ Aligned with other efforts in bio-ethanol, bio-methanol, bio-CNG, H-CNG, Bio-gas plants.

Bio-fuels are instrumental in giving alternate livelihood to farmers for low agricultural pot productivity areas, also help in reduce import bill and help achieve INDC targets to reduce carbon emissions.

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5. Zero Budget Natural Farming (ZBNF) provides an alternative to capital and chemical intensive agriculture currently being practiced in India. Analyze. **(150 words) 10**

जीरो बजट प्राकृतिक कृषि (ZBNF), भारत में वर्तमान समय में प्रचलित पूंजी और रसायन गहन कृषि का एक विकल्प प्रदान करती है। विश्लेषण कीजिए।

As devised by Subhash Palekar and fairly getting popular in Maharashtra and Andhra Pradesh like states ZBNF can help reverse agricultural soil deterioration and help growth in farm sector.

Features of ZBNF :

① ~~ters~~ seed reusage and no buying from outside.

② Reuse of wastage to form bio-mass to be used as manure and fertilisers.

③ Effective means of irrigation and water harvesting to save costs and water.

④ Scientific crop selection to avoid loss and damage and

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maintain soil fertility.

Limitations to ZBNF :-

① Not as successful in Maharashtra to be implemented overall.

② Many farmers are returning back to original methods.

③ Requires heavy labour and scientific management, not easy in Indian context.

④ In the start, may affect food security.

Initiatives like ZBNF, zero-tilling, organic Farming require more study and tuning in decentralized manner as suited to particular agricultural systems. Salinisation and declining soil productivity is a cause for concern and requires apt measures to promote sustainable inclusive growth.

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6. Marine life is facing 'irreparable damage' from the millions of tonnes of plastic waste which ends up in the oceans each year. In this context, examine the implications of plastic pollution on marine ecosystem and suggest some measures for addressing this problem. **(150 words) 10**

समुद्री जीवन, प्रति वर्ष समुद्र में पहुँचने वाले लाखों टन प्लास्टिक कचरे के कारण 'अपूरणीय क्षति' का सामना कर रहा है। इस संदर्भ में, समुद्री पारिस्थितिकी तंत्र पर प्लास्टिक प्रदूषण के प्रभाव का परीक्षण कीजिए और इस समस्या के समाधान हेतु कुछ उपाय सुझाइये।

Honolulu Strategy for tackling marine pollution has been devised. India is dedicated member to it and ~~an~~ already has started taking efforts in this direction. such as banning of single-use plastic from October, 2.

Implications of Plastic pollution on marine ecosystems.

① Works as bio-accumulator in marine environment.

② Can be consumed by large and small fishes.

③ Decomposes to release harmful chemicals after long time under

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sun, in water.

④ Gets into the lungs of ~~an~~ amphibians, causing fatal damage.

Measures to check this:

① Coastal management to reduce throwing up of waste and pollution on beaches and all.

② check into discharge by sewage, industries only after proper treatment.

③ Pollution caused by shipping industry is no less detrimental.

④ Fishing industry is huge contributor to such marine pollution.

Ocean Cleanup for Great Pacific Garbage Patch; Blue Flag Coastal Scheme to cleanup coasts; UN Convention on Laws of Seas for pollution via Ships are some significant global efforts in this direction.

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7. Write a short note on the evolution of Bharat Stage norms in India. Also discuss the significance and challenges posed by the planned introduction of BS-VI norms in India from the year 2020. **(150 words) 10**

भारत में भारत स्टेज मानकों के विकास पर एक संक्षिप्त टिप्पणी लिखिए। साथ ही, वर्ष 2020 से भारत में BS-VI मानकों को योजनाबद्ध रूप से लागू किए जाने के महत्व और उसमें आने वाली चुनौतियों की भी चर्चा कीजिए।

Skipping BS-V India has decided to move to BS-VI directly from BS-VI.

They are inspired from Euro Standards at same level. Earlier their implementation was late, but now focus has been higher for its effect on city pollution and emissions.

Significance of such introduction:

1. Significantly reduce sulphur emission to 20% of original.
2. Reduce Nitrogen and PPM emissions as well.
3. Improve engine efficiency and overall reduce city pollution for which vehicular emission has more

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than 40% contribution.

Challenges with BS-VI stage:

① Resistance from auto-makers who need to make investment for engine upgrades.

② Old vehicles will face pressure.

③ Already struggling auto-industry will raise prices thus reducing demand.

④ Strict implementation of BS-VI is difficult to carry out.

⑤ Fuel marketing and distributors need to look up.

⑥ Reduce thrust for e-vehicles.

BS-VI introduction is a very step forward and sustained govt. policy in this direction is commendable but this must not be seen as an end. Rather many more steps need sustained efforts like this. including bio-fuels, e-vehicles etc.

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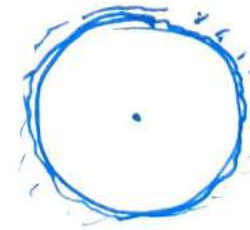
8. What are black holes? Highlight the challenges in imaging a black hole? How were these challenges overcome by the Event Horizon Telescope project? **(150 words) 10**

ब्लैक होल क्या हैं? ब्लैक होल के चित्रण (इमेजिंग) में आने वाली चुनौतियों पर प्रकाश डालिए। इवेंट होराइज़न टेलीस्कोप प्रोजेक्ट द्वारा इन चुनौतियों को कैसे दूर किया गया?

Black Hole is the last stage of a star in which it becomes so dense and that it collapses upon itself and has so high gravity potential that no even light can escape that.

Imaging Black hole as recently released was a challenge in itself because ~~the~~ no light comes from black hole so its study and detection becomes even more complex.

Technique used by Event Horizon Telescope Project →



Because black holes attract all objects that surround that, space, dust, meteors,

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all close heavenly objects race towards black hole due to gravity pull.

We know that a particle under ~~electromagnetic radiation~~ acceleration releases electromagnetic radiation. So while these particles get close to black hole they form a ring like figure emitting electromagnetic radiation.

~~It~~ Even Horizon Telescope could succeed in capturing these radiations to form ~~an~~ a ring like surrounding image of black-hole.

LIGO, CERN are other significant experiments going on for study into origin of universe. Indian efforts are also commendable such as large telescopes (GROWTH) and Neutrino Observatory and others.

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9. While mentioning the objectives of the Arms Trade Treaty (ATT), discuss the challenges which are hindering the utilization of the ATT to its full potential.
(150 words) 10

शस्त्र व्यापार संधि (ATT) के उद्देश्यों का उल्लेख करते हुए, उन चुनौतियों की चर्चा कीजिए जो ATT को इसकी पूर्ण क्षमता से उपयोगित किये जाने में बाधक हैं।

Arms Trade Treaty is a mechanism at the global level to promote cooperation within nations to ensure safe and peaceful coexistence while upholding each other's sovereignty.

Detailed objectives include:

① Promote transparency in Arms Trade across nations.

② Reduce corruption, bribery and fraud.

③ Ensure that proceeds from these do not end up with terrorists ~~et~~.

④ Ensure such arms do not

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find themselves with dictators or terrorist organisations.

⑤ Ensure arms are not meant ~~to~~ for aggression but just to uphold and protect sovereignty.

Challenges in its ~~full~~ optimum utilisation:

① Lack of global cooperation and openness to divulge any trade deals.

② Fear of some countries by their competitors to develop similar.

③ Efforts by producers to keep their tech ~~and~~ secret.

④ Middlemen who carry out these trade deals are very powerful and take deep cuts via bribery and manipulation.

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10. Threats to internal security of India may be posed both through the communication networks and also to the networks. Discuss. Also, highlight the steps taken by the government in making the networks more secure.
(150 words) 10

भारत की आंतरिक सुरक्षा को खतरा संचार नेटवर्कों के माध्यम से एवं स्वयं संचार नेटवर्कों को खतरा होने, दोनों ही प्रकार से हो सकता है। चर्चा कीजिए। साथ ही, नेटवर्कों को अधिक सुरक्षित बनाने हेतु सरकार द्वारा उठाए गए कदमों पर प्रकाश डालिए।

India has been teemed as ~~more~~ the most cyber security wise vulnerable nation. Today communication networks form integral link for security they are both vulnerable for themselves and to the security of the nation.

Threats are such as:

① Cyber-hacking and cyber warfare as pushed by Russia, china.

② Increasing digitization of country and reliance on e-governance.

③ Financial dependence on communication networks.

④ Primary and personal data of

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millions of Indian users.

⑤ lack implementation and unsafe practices in Indian setup for cyber-security precautions.

Some steps taken by Indian Govt. Include.

① Botnet Cleaning framework and Cyber Surakshit Bharat Initiative.

② Cyber Suraksha Kendras online for cleaning up file systems.

③ Establishment of CERT-In, CERT-Fin, National Cyber Coordination Committee (NCCC); Defence Cyber Agency.

④ Holding up Global Cyber Security Conference (GCCC) in 2017 in Delhi.

India should take active steps for ratifying Budapest Convention and take security precautions for 5G, AI, IoT etc.

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11. Highlight the importance and challenges related to integration of Variable Renewable Energy (VRE) in India. Mention some steps that can be taken for its smooth integration with the synchronized Indian grid. **(250 words) 15**

भारत में परिवर्तनीय नवीकरणीय ऊर्जा (VRE) के एकीकरण के महत्व और इसमे संबंधित चुनौतियों पर प्रकाश डालिए। ऐसे कुछ कदमों का उल्लेख कीजिए जो समक्रमिक (सिंक्रनाइज्ड) भारतीय ग्रिड के साथ इसके सहज एकीकरण के लिए उठाए जा सकते हैं।

SMART Grid for India is an effort to integrate decentralized energy production including renewable energy into the main grid across the country to solve energy woes both supply and demand side.

~~Int~~ Variable Renewable Energy concept allows use of renewable energy as and when available otherwise ~~realiti~~ relying upon conventional sources via ~~some~~ grid.

Importance of VRE

① Provide boost to renewable energy generation.

② Create demand for renewable energy otherwise not relied upon

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③ Reduce energy demand supply gap in India and help reduce critical infra gap in power.

④ Challenges to such integration

① Transmission costs are already very high in India owing to losses and old setup.

② Robust network is critical for such integration that can handle frequent changes and heavy load. Indian experience is poor in this owing to poor transmission infra and set-up.

③ Requires technological advancement and skilled maintenance.

④ Renewable energy generation is very seasonal and inconsistent.

⑤ Power linkages to power plants for heavy power loads are already set-up. Power producers may

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put resistance to such efforts at integration of VRE.

Steps that can be taken:

① Subsidy and tax benefits for use of renewable energy.

② Power Purchase Agreements to be made more ~~strict~~ flexible yet effective.

③ More funding on project basis for research into this.

④ Work towards future of a South Asia grid incorporating neighbouring countries as well.

VRE provides a golden opportunity for Indian Energy sector to ~~hit~~ hit multiple ~~shots in one~~ goals in one shot. Towards sustainable inclusive New India, it will be a significant step.

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12. There have been arguments that India could fall into a 'middle income trap'. Explaining the phenomenon, highlight the reasons behind such arguments. How can India avoid it? **(250 words) 15**

ऐसे तर्क दिए गए हैं कि भारत 'मध्यम आय पाश' में फंस सकता है। इस परिघटना की व्याख्या करते हुए, ऐसे तर्कों के लिए उत्तरदायी कारणों पर प्रकाश डालिए। भारत इससे किस प्रकार बच सकता है?

Last Economic survey pointed to the possibility of ~~falling~~ India falling into the middle-income 'trap'. for countries like Greece, in Europe and Argentina, Mexico.

'Middle-Income Trap' refers to :

① Further economic growth is substantially slowed down after good economic growth in the past.

② This occurs mainly due to rising labor, power, living costs in the country that no more makes it an investment destination.

③ Domestic supply and demand; savings & investments are not

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enough to sustain growth in future.

Susceptibility of India for falling into such trap:

① Growth is largely derived from foreign investment.

② Skilled labour costs are missing and getting expensive.

③ Domestic research in new-age technologies, R&D is missing.

④ Small companies are not turning into big. 'Dwarf character' of Indian companies.

⑤ Poor savings and investment at home.

⑥ Poor fiscal discipline, population and large debt to be repaid.

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Way Forward to avoid:

1. Promote ease of doing business.
2. High FDI and support via Infra.
3. Give boost to skilling, entrepreneurship.
4. Show research and development, IPR protection and innovation at home.
5. Defence manufacturing to be promoted.
6. Formalization and support to small companies to grow big.

NPAs, corruption, bribery, red-tapism are some of the ills of our economy today that need to be solved to sustain growth in future for we have a large population still living under poverty to be moved out.

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13. Highlighting its importance, discuss the major issues that plague effective monetary policy transmission in India. Also, mention the steps taken by RBI to improve it. **(250 words) 15**

भारत में मौद्रिक नीति संचरण के महत्व पर प्रकाश डालते हुए, उन प्रमुख मुद्दों पर चर्चा कीजिए जो इसकी प्रभाविता को बाधित करते हैं। साथ ही, इसमें सुधार के लिए RBI द्वारा उठाए गए कदमों का उल्लेख कीजिए।

In 2019, RBI has reduced around 70 basis points but banks have transmitted only 20-20 of it. Recent steps at MCLR based mechanism haven't yield results and requires further efforts and strict enforcement looking into issues of banks' governance.

Importance of monetary policy transmission:

① Reduce profiteering by banks and benefit to the intended common men.

② To actually bring into effect the monetary policy in the country.

③ To bring change in currency

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flow and slip into inflation or transmit growth opportunities.

(4) Challenges in Monetary Policy Transmission:

① NPA issues with banks who want some profits to ensure sustenance.

② Large operational costs of banks that need to be recovered from the difference in lending rates.

③ Priority sector lending and various other obligations by the banks don't give much space to ensure profits.

④ Poor transparency and accountability at bank management and board level for governance.

Steps to check into this:

① Changing from Base lending rates to MCLR based system.

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(2) Efforts now to move from MCLR to a financial asset pegged rates (Repo rate, Treasury bills etc.) by RBI

(3) Moral suasion done by RBI.

(4) PCA and close monitoring by RBI to sign into NPA issue.

(5) IBC and GST are efforts that aim to bring more ease of doing business and help banks get back money via easy resolution.

Although many arguments are made into ineffectiveness of monetary policy in India, it still remains a tool to control ~~growth~~ inflation and promote growth coupled with fiscal policy of the nation. Monetary policy Committee (MPC) has a responsible task at hand and must be done with full integrity.

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14. Highlight the constraints faced by rainfed agriculture in India. Discuss some agronomic practices that can be adopted for stabilizing agricultural production in rainfed areas. **(250 words) 15**

भारत में वर्षा सिंचित कृषि में आने वाली बाधाओं पर प्रकाश डालिए। वर्षा सिंचित क्षेत्रों में कृषि उत्पादन को स्थायित्व प्रदान करने हेतु अपनाई जा सकने वाली कुछ कृषि-वैज्ञानिक पद्धतियों की चर्चा कीजिए।

In a recent report it was highlighted that most of subsidies and support in agricultural sector went to the non-rainfed areas thus leaving rainfed areas to the mercy of rain gods.

Constraints faced by rainfed agriculture in India:

① Erratic monsoonal rainfall pattern.

② Over-reliance on rains and not enough measures like irrigation in case of extremities.

③ Non surplus production.

④ Sometimes too much and

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untimely rain causing destruction of crops affecting the crop cycle.

(5) ~~Dro~~ Below normal or too much rainfall causing debt-trap not to be paid back due to ~~to~~ absence of ~~non~~ surplus production.

Some agronomic practices and measures to resolve issues:

(1) effective irrigation policies and facilities.

(2) making rainwater harvesting structures and recharging groundwater to be used later.

(3) Early warning and prediction systems via forecast to select right farming strategy.

(4) Growing less water-intensive crops.

(5) Trying multiple cropping.

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organic farming and ZBNR.

(6) Goiy for non-food crops that pay more. and allied agricultural activities like dairy, livestock, agro-forestry etc.

PM Paramparagat Krishi Vikas Yojana, PM Krishi Sinchayee Yojana, KISAN SAMPADA scheme, Nutrient-based Fertiliser subsidy are some of the steps taken in addition KISAN Nidhi that must be made full use by farmer to usher scientific and sustainable agricultural production.

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15. Despite the steps taken by the government in recent years, a number of problems continue to persist in the urea sector in India. Discuss. What reforms should be taken to address the persisting problems?

(250 words) 15

हाल के वर्षों में सरकार द्वारा उठाए गए कदमों के बावजूद, भारत में यूरिया क्षेत्र में कई समस्याएं निरंतर बनी हुई हैं। चर्चा कीजिए। मौजूदा समस्याओं के समाधान हेतु क्या सुधार किए जाने चाहिए?

Recently government has moved towards nutrient-based fertiliser subsidy looking at serious issues in nutrient management in soils in our country.

Problems with soils in our country especially related to Urea:

① Excessive use of fertilisers which are urea based thus soil nutrient healthy proportion of NPK and others in disturbed.

② Black marketing and poor standards of fertilisers provided.

③ Poor farmers not getting benefit.

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④ Lack of production of other critical fertilisers that otherwise ~~give~~ yet less support from the government.

Some reforms in this sector

① Nutrient-based subsidy now that pays to the producer directly as per the composition.

② Kisan Soil Health Card and Krishi Vigyan Kendras to strategize soil ~~mang~~ management.

③ ~~Smart~~ Sprinkler systems that can distribute fertiliser in the soil along with the water for effective reach and absorption by the soils

④ Moving to ZBNF Organic bio-mass based manure and nutrient supply.

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(5) Digitization and strict penalty over quality control for fertilisers.

Govt. has taken many initiatives in the past and also looking deeply into current trends.

Salinisation and degrading fertility of soil as in Haryana, Punjab is a serious concern and requires multi-stakeholder approach to ensure sustainable agriculture production.

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16. What is Access and Benefit Sharing? Explain how it aids in sustainable use of biodiversity. Also, mention the different global and national level mechanisms for ensuring Access and Benefit Sharing. **(250 words) 15**

पहुंच और लाभ साझाकरण (एक्सेस एंड बेनिफिट शेयरिंग) क्या है? यह जैव विविधता के संधारणीय उपयोग में किस प्रकार सहायक है, स्पष्ट कीजिए। साथ ही, पहुंच और लाभ साझाकरण सुनिश्चित करने हेतु वैश्विक और राष्ट्रीय स्तर की विभिन्न प्रणालियों का उल्लेख कीजिए।

Access and Benefit sharing is the concept that ensures that benefits and use of biodiversity are made available to one and all for protection of bio-diversity and its sustainable use in socio-economic progress.

Positives of Access and Benefit Sharing (ABS) :

① allows technology share and use for healthy maintenance of bio-diversity services.

② management and protection practices can be shared for sustainable management.

③ show global cooperation in environmental and bio-diversity

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conservation and safe, responsible use.

(4) Control and fight illegal trade in live objects.

Globally Access and Benefit Sharing concept has arisen in consonance with that of Prior Informed consent (PIC) and safe export-import or trans-boundary movement of hazardous substances under tripal conventions of Basel, Rotterdam and Stockholm Conventions (BRS).

Domestically India has taken laudable ~~it~~ efforts along with global cooperation to control illegal trade (~~wee~~ CITES has awarded WCCR) and sharing

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with knowledge on bio-diversity across the boundaries.

India is a bi mega-biodiversity hotspot and both require support and techniques for their protection ~~as well~~ and use as well has enough traditional and scientific bio-technology research base to lend valuable knowledge.

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17. Stating the significance, discuss the challenges in achieving disaster resilience of infrastructure. Suggest some ways for mainstreaming it in the development paradigm. **(250 words) 15**

अवसंरचनाओं का आपदाओं के प्रति सुनम्य (रेजिलिएंट) होने के महत्व को स्पष्ट करते हुए, इससे संबंधित चुनौतियों की चर्चा कीजिए। इसे विकास प्रतिमान की मुख्यधारा में लाने हेतु कुछ उपाय सुझाइये।

National Disaster Management Policy and Action Plan derives a lot from Sendai Framework continuing from Hyogo Framework for disaster management.

Significance of Disaster Resilient Infrastructure:

① Reduce loss of property and lives.

② Easy rehabilitation post-disaster.

③ Preparedness pre-disaster is made more effective.

④ Communication lines remain function even during disaster, critical to disaster management.

⑤ Avoids disaster in the first place.

Challenges in achieving such resilient systems:

① Require funds from the government, otherwise always lacking.

② Community support, contribution and preparedness in using and maintaining them is critical.

③ Focus on only creation and not maintenance reduces their functionality.

④ Need best technology and foreign collaboration.

Today, there is a need for sustainable and inclusive growth and our development paradigm must include disaster management as a key paradigm in manner such as :-

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① Sharing and effective building codes and fire-safety and other mechanism.

② Vijilance and heavy penalty on their poor standards.

③ Clear accountability mechanism in case of delinquency.

④ All employes within an organisation to make aware of such systems and their use.

⑤ Global Conferences and support from expert countries like Japan in solving problems peculiar to our context.

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18. Highlighting the significance of data localization for India, discuss various challenges associated with data localization. **(250 words) 15**

भारत के लिए डेटा के स्थानीयकरण के महत्व पर प्रकाश डालते हुए, डेटा के स्थानीयकरण में जुड़ी विभिन्न चुनौतियों की चर्चा कीजिए।

Recently in its draft E commerce policy, govt. has emphasized upon data localisation in India. Also in the past RBI made data localisation mandatory for payments and settlements system and financial transactions. Companies like Amazon and FB and Walmart have raised concerns.

Significance of data localisation in India:

① Cyber security and robustness of cyber physical systems will improve. Reduced chances of data theft.

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(2) Protection of critical private, personal data of users, heavily generated on social networking.

(3) Protection of financial frauds and manipulation.

(4) Protection of genuine interests of local data providers.

(5) Domestic servers created and benefit to local IT companies competing against giant ~~foreign~~ MNCs.

Challenges associated with this:

(1) Data localisation doesn't ensure cybersecurity. Other measures are as important and critical.

(2) Reduces critical investment and shies away companies doing business in India.

(3) Reduces global cooperation and affects Indian image for trade

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purposes.

(4) Copy of data saved outside can still be used for all purpose of manipulation.

(5) Domestic infrastructure is not enough to support localisation.

Government must work with global agencies, private companies both local and global and the consumers of IT services to decide upon extent of data localisation.

For India is an IT hub as both market and service provider, such policies can go a long way affecting business environment. Pragmatism must lead the way.

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19. Money Laundering as a socio economic offence is a menace especially for developing countries like India. Comment. What measures have been taken at the domestic and international levels to deal with this menace?
(250 words) 15

एक सामाजिक आर्थिक अपराध के रूप में धन शोधन विशेषकर भारत जैसे विकासशील देशों के लिए एक खतरा है। टिप्पणी कीजिए। इस खतरे से निपटने हेतु घरेलू और अंतरराष्ट्रीय स्तर पर क्या उपाय किए गए हैं?

Money laundering is defined as all those means that aim to convert black money into white via various complex transactions finding loopholes in the laws of the countries.

How it affects developing countries like ours deeply :-

① Allows corruption and process of crime to flourish.

② Avoids and prevents collection of valuable and significant revenue via taxes.

③ Most of the times this involves criminal activities, extortion,

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illegal trade and terrorism thus affecting not just economic but socio-political systems as well.

(4) ~~Allows~~ Reduces space for sovereign governments and central banks to devise fiscal and monetary policies, because lot of economy goes undercovers.

Domestic & International measures at this

(I) Domestic

① Prevention of Money Laundering Act, 2002 and powers to ED via this.

② Increase in scope of NIA and UAPA to include economic offences.

③ Institution of serious economic fraud ~~off~~ investigation officer

④ Bringing of fugitive ~~ec~~ economic

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offender ~~po~~ ~~por~~ related provision to seal their property as they do not cooperate with investigation.

⑤ FIU-ND setup under Finance Ministry.

International Efforts.

① FATF has got teeth via strict compliance.

② Cooperation with other agencies such as WTO, UN and Interpol.

③ Global cooperation and standards to nab money laundering.

④ Base Erosion Profit Sharing Code developed at OECD.

An overall governance framework ability across social, economic and political spheres only can help control this menace. Reduction of corruption and black-money is critical for India to grow & prosper.

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20. The primary motive of terrorism differs from that of organised crime but there exists a symbiotic relationship between the two. Discuss.

(250 words) 15

आतंकवाद का प्राथमिक उद्देश्य संगठित अपराध के उद्देश्य से भिन्न होता है, किन्तु दोनों के मध्य एक सहजीवी संबंध पाया जाता है। चर्चा कीजिए।

Recently UN has for the first time released a framework on cooperation in counter-terrorism and UN Convention against Trans-national Organized Crime (UNCTOC) already exists.

Both the crimes may be different but share a cause and effect relationship with each other such as:

① Proceeds of Trans-national Organised Crime often land up with terrorists to carry out their agenda war.

② Terrorists provide a link, network and ideological foundation for organised crime to grow and

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spread across countries.

③ Both depend upon weak governance, political systems and criminal justice system.

Some Examples include:-

① Terrorists in middle East only days grown in Afghanistan and Central Asia and selling it across the world undercover to generate funds.

② Archaelogical artefacts from Syria, Egypt and other countries sold in black market in Europe by ISIS.

③ Hawala and ~~Drug~~ gun-trade done in major cities in India controlled by Dubai based middleman working for ideological Islamist propaganda.

④ Oil and major Arms Trade

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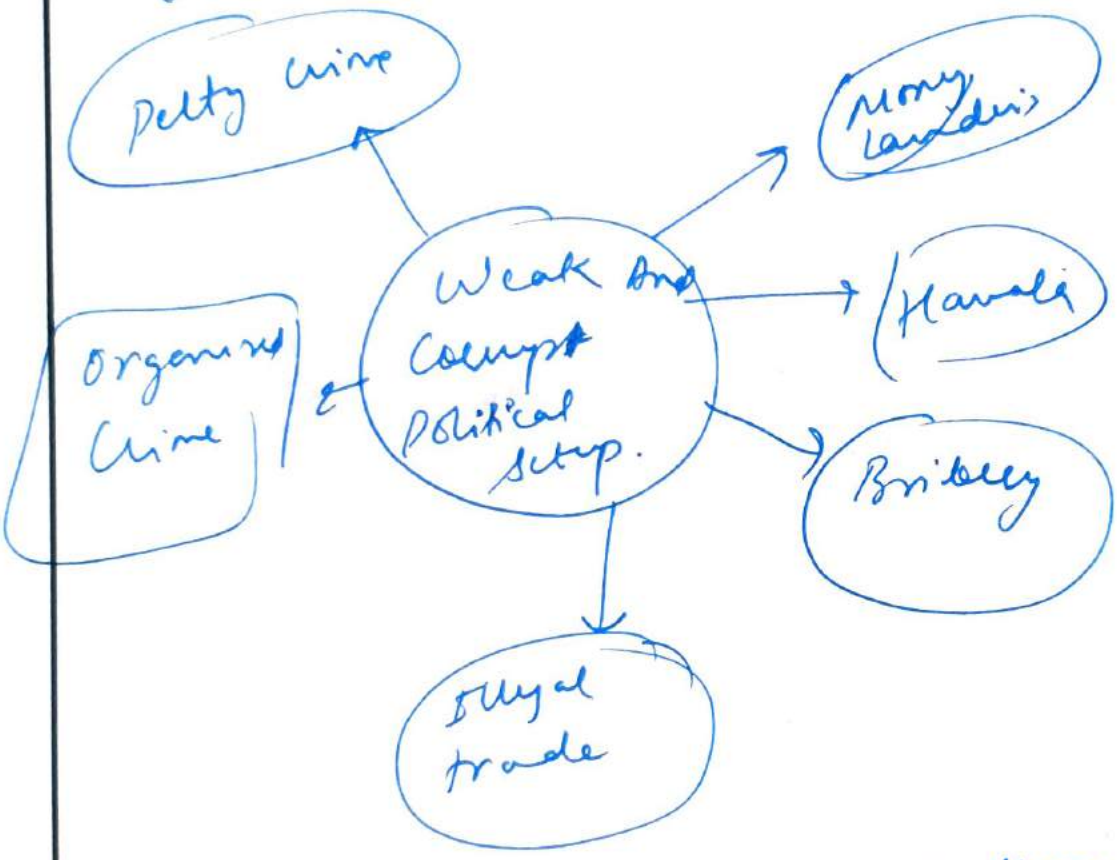
Across the countries handled by middlemen who take their cut in return for networks with corrupt politicians and bureaucrats.



Terrorism actually uses all these and strengthens all of them in exchange, to spread its wings. Global cooperation and commitment is required from top level to eradicate these ills from the root.